





# 'Shortening the river'

## Henry Bosse's images of the changing Mississippi

by Ron W. Deiss

"The military engineers of the Commission have taken upon their shoulders the job of making the Mississippi River over again," Mark Twain observed in 1883, "a job transcended in size only by the original job of creating it. They are building wing dams here and there, to deflect the current; and dikes to confine it in narrower bounds; and other dikes to make it stay there."

Twain, in *Life on the Mississippi*, was referring to the enormous changes federal engineers were undertaking on the Upper Mississippi River. And he doubted that their efforts would succeed: "They have started in here with big confidence, and the best intentions in the world; but they are going to get left. What does Ecclesiastes 7:13 say? ['Consider the work of God; for who can make that straight which He hath made crooked.'] Says enough to knock *their* little game galley-west, don't it?"

About the same time that Mark Twain was remarking on what he called "shortening the river," another American, also entranced by the Mississippi, was photographing the river, its commerce, and the make-over that Twain was scoffing at. Henry Peter Bosse would photograph the Upper Mississippi between 1883 and 1892, thereby chronicling the river during a pivotal period of its history and during one of America's largest civil works projects.

Since the mid-19th century, photographers had been hired to record large government surveys, scientific expeditions, and civil works projects, generally within the context of discovery, exploration, or change in the landscape. Although many photographed the river between St. Paul and St. Louis, Bosse captured its essence, with excellent composition and unequalled aesthetic appeal.

Born in 1844 in Prussia, Bosse

Among the river improvements Bosse photographed were constricting or wing dams (left), which reduced the natural meandering and braiding of the river by contracting or combining flows into one channel of uniform width. These long, narrow dams extended from the bank into the river at various angles, sometimes crossing sloughs to islands but never crossing the navigation channel. Dam construction was labor intensive and began with cutting willow brush. The willow was woven and bound into bundles called fascines, which were tied together into large mattresses. The mattresses were floated on the water, then covered with quarried rock until the entire structure sank. The dam was built to the required height by alternating layers of mattresses and rock. As silting occurred behind the dam, this further constricted the channel, increased the current, and scoured the river bottom, resulting in an even deeper channel. Wing dam construction was so extensive that by 1880 Corps engineers worried that they would exhaust the native willow supplies.

U.S. ARMY CORPS OF ENGINEERS, ROCK ISLAND DISTRICT



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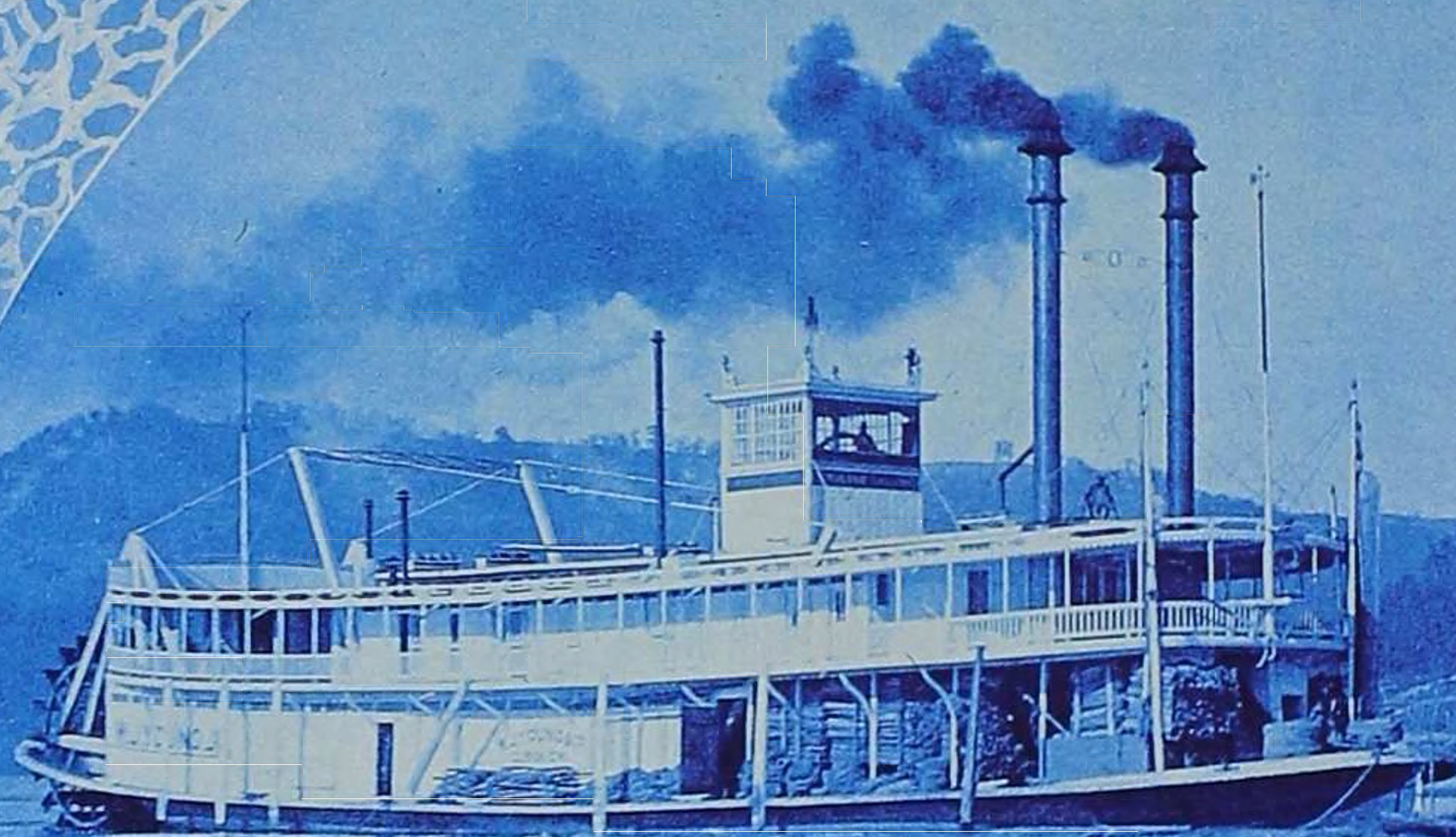
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U.S. ARMY CORPS OF ENGINEERS, ROCK ISLAND DISTRICT





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*Raftboat "W. J. Young."  
(inst. 1885.)*

U.S. ARMY CORPS OF ENGINEERS, ROCK ISLAND DISTRICT


**R**aftboats like the *W. J. Young Jr.* (above) were the work-horses of the Mississippi, steering enormous rafts of logs to sawmills. In Bosse's 1885 photograph, the raftsmen lean on their cant hooks and face the camera. The many ricks of cordwood for fuel on the main deck suggest a long haul, probably to Clinton, Iowa.

In 1882, Mark Twain had described such rafts: "Up in this region we met massed acres of lumber rafts coming down—but not floating leisurely along, in the old-fashioned way, manned with joyous and reckless crews of fiddling,

song-singing, whisky-drinking, break-down-dancing rascals; no, the whole thing was shoved swiftly along by a powerful stern-wheeler, modern fashion, and the small crews were quiet, orderly men, of a sedate business aspect, with not a suggestion of romance about them anywhere."

The *W. J. Young Jr.* was built in Dubuque in 1882 for saw-mill baron W. J. Young, Clinton's second largest employer. From 1866 to 1886, Young's Big Mill reportedly had the largest saw in the West, with a 1,000-horsepower steam engine and a flywheel 18 feet in diameter.





was formally educated in art and engineering. About 1870, he immigrated to America, and by 1874 had entered the U.S. Army Corps of Engineers as a draftsman at St. Paul, Minnesota. Four years later, Bosse was transferred to Rock Island, Illinois. He stayed in this area, working for the Corps for the remainder of his life. He would be remembered as a creative, talented artist with a sense of humor, and, in his obituary, as "a man of culture and impressive intellect, albeit of aristocratic manner. . . . with a robust physique and pronounced military bearing."

**B**osse's tenure in the Corps fell within one of its major phases of improvement to make the river more navigable, especially where rapids and obstructions had long endangered river traffic. Although the most skilled steamboat pilots learned to navigate stretches of treacherous waters by memorizing landmarks, watching the water surface, and noting changes, steamboat explosions, fires, collisions, groundings, and wrecks were common.

Efforts earlier in the century had only begun to address the problems. Then, after the Civil War, a booming lumber industry and westward settlement provided military and economic justifications for viable river transportation. Speculating that extensive river improvements would reunite the country by opening up trade routes between the North and

South, Congress assigned the U.S. Army Corps of Engineers the monumental task of improving inland waterways under legislative acts in 1866 and 1878.

This second act, a comprehensive project called the Upper Mississippi River Improvement, required the construction and maintenance of a 690-mile-long channel with a guaranteed depth of 4½ feet. This meant that steamboats with just under that much draft would now be able to use the Upper Mississippi from

the spring rains until the winter freeze. Yet many pilots thought that the Corps would fail, that it was an impossible feat to alter the tremendous force of the Mississippi. Rivermen's jests quickly diminished as the navigation season was extended, and wrecks and groundings decreased.

As a Corps draftsman during this era, Henry Bosse created maps, navigational charts, plans, and specifications for harbor, levee, and channel improvements. By 1883, he had begun to compile a comprehensive photographic record of Corps work as part of the immense support documentation necessary. Many of his photos were included in Corps reports to Congress describing improvements, recommending projects, and justifying expenditures.

During reconnaissance surveys, Bosse traveled by steamboat, assisting engineering parties, recording river conditions, and documenting construction projects. Bosse and at least one assistant would transport his heavy camera, tripod, 11x14-inch "dry chemical" plate glass negatives, and other accessories to the chosen site—often a bluff or hillside overlooking the river. He composed other images from levees or sandbars, from high rooftops or the river's edge.

Bosse used cyanotype, albumen, and various gelatin black-and-white processes to print from his negatives. Although the cyanotype process was relatively inexpensive (it would eventually evolve into the blueprint process), it yielded great clarity. Its characteristic Prussian blue penetrated the paper, providing the high degree of resolution and stability preferred by engineers, scientists, and artists.

Bosse took approximately 300 different images of the Upper Mississippi River Improvement; a sampling of his photos related to Iowa appears here. He meticulously documented subject, location, direction, and water conditions. He framed his images with oval, circular, or rectangular mats or vignettes, and bound sets of them into albums, each with an elaborately hand-lettered and decorated frontispiece.

One of the albums was displayed at the 1893 World's Columbian Exposition in Chicago, following a request by the War Department that all major civil and military branches provide photographs, maps, or exhibits. The album's depiction of waterway improvements and river commerce would have fit in perfectly with the fair's intention to glorify human achievements in the New World. A few of the albums were apparently presented to high-ranking engineers, and over the years they passed into the hands of river historians and collectors; others remained with the Army Corps of Engineers. Today, only six bound sets of al-





U.S. ARMY CORPS OF ENGINEERS, ROCK ISLAND DISTRICT

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bums of Bosse's rare photos are known to still exist.

Without question, the improvement of the river as a transportation system is the dominant or implied theme of Bosse's photographs. Although people are not central to the photographs, Bosse included human figures in many images to provide scale or add depth, to animate improvements or generate interest. A few images with people provide insights into the Corps and its infrastructure, illustrating the social and military hierarchy of the river. Employees are shown at their assigned posts: pilots in the pilothouse, mechanics close to equipment or locks. Surveyors hold range poles, and crews operate dredges and boats. Seasonal or contracted laborers are engaged in chores under the watchful eyes of their supervisors and seem indifferent to the photographer. In contrast, officers, engineers, and supervisors convey a military presence, proudly facing the camera or monitoring the workers.

Bosse's formal education and training as an illustrator are evident in the quality and consistency of the photographs. Bosse composed images that embody the essential characteristics of the river and its valley. In his bird's-eye perspectives, the viewer is drawn into the grandeur through the varied topographic relief. His compositions reveal varying degrees of influence by 19th-century romanticism; many of his "vistas" depict idyllic and ageless scenery or natural settings.

Yet, as pointed out by the curator of photography at the Smithsonian's National Museum of American History, Bosse's photographs also reveal a shift from romantic to industrial and geometric subjects. The human artifice of Bosse's vistas are the monumental features of river improvements. Bridges and urban growth serve as popular symbols of industrial complexity, opportunistic development, and evolving transportation networks of the late Victorian period. Although the enormity of the river sometimes dwarfs the structures, the images give a decided air of credibility and dignity to the massiveness of architecture and the built environment.

The dynamic change that underlies Bosse's compositions also reflect changes in the dynamics of river

commerce and communities. By the late 19th century, river traffic was decreasing. Even as the Corps tamed the Mississippi, the hills and valleys of the Upper Midwest were being stripped of timber for lumber, lath, shingles, and millwork, and the extensive prairies turned to cropland and pasture. Although river traffic remained important for moving agricultural products and timber, it was seasonal, costly, inefficient, unpredictable, and limited to short-haul routes. Conversely, the extensive railroad system that connected nearly every settlement coast to coast supplied the raw materials to industries and carried the larger share of agricultural products to market.

Nevertheless, Corps improvements continued, long after Bosse's death in 1903. In efforts to accommodate larger boats, barges, and towboats, Congress authorized first a six-foot and then a nine-foot channel. By 1940, the nine-foot channel and its system of 27 locks and dams were completed; in response, river traffic picked up as new diesel towboats barged the nation's grain, fuel, and other bulk commodities.

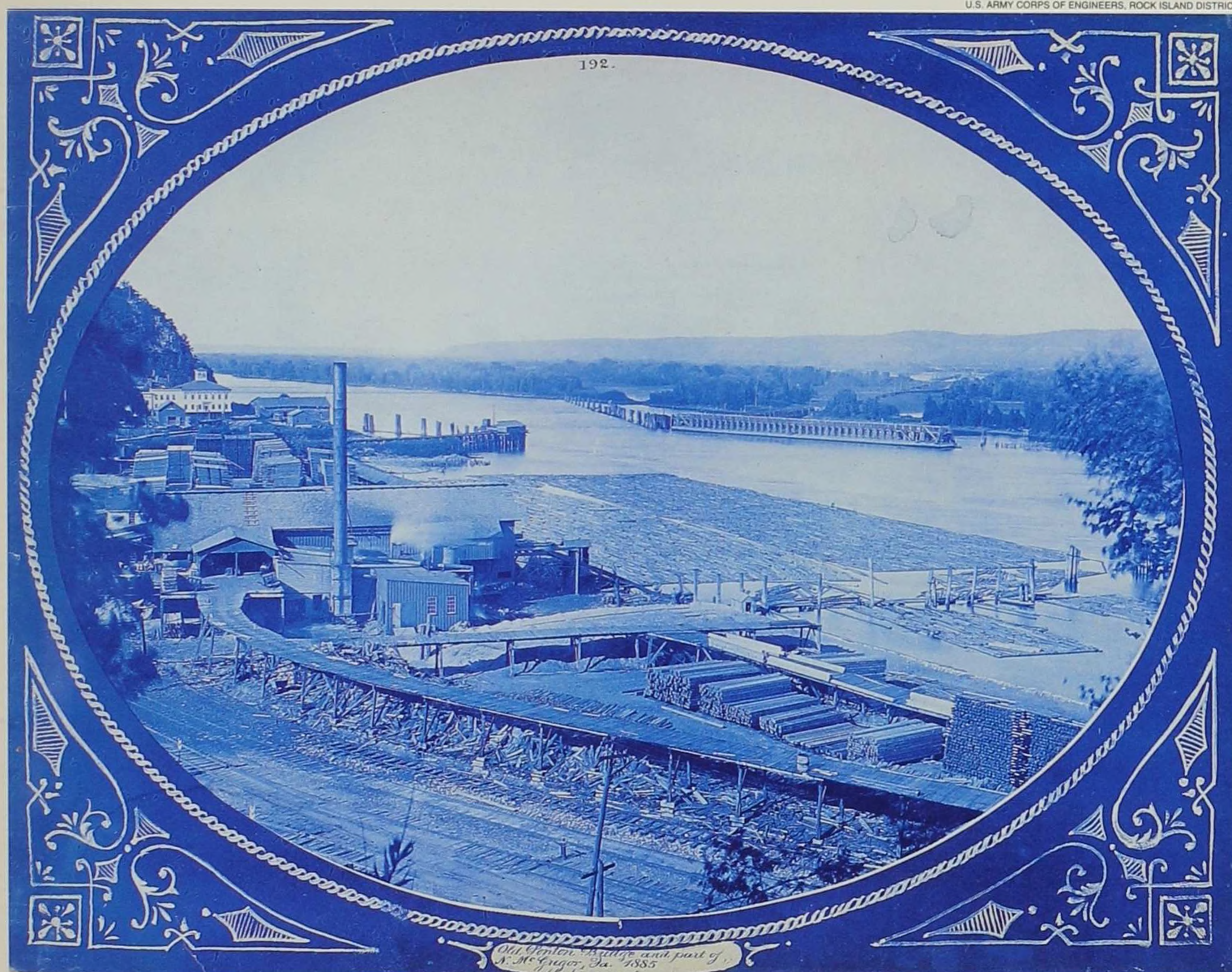
**B**osse's photography shows the Upper Mississippi transformed from a natural, free-flowing, sometimes dangerous river into a safe, dependable transportation waterway. As a comprehensive, thematic collection, it comprises informative, well-documented scenes taken at appropriate intervals; at the same time it depicts the beauty and grandeur of the river. His treatment of the subject matter illustrates change and growth within aesthetic compositions, rather than emphasizing romantic nostalgia with traditional symbols. Bosse succeeded as one of the earliest landscape photographers to depict modern constructs as having artistic merit. He left a superb photographic record of the Corps of Engineers' great experiment of "shortening the river" and of the changing commerce and landscape of the Upper Mississippi.

*Ron W. Deiss is a historian and district archaeologist for the U.S. Army Corps of Engineers in Rock Island, Illinois, and has published many histories and excavated many sites on the river.*

#### NOTE ON SOURCES

Major sources include: Ed Brick, "Mike Spettel's Better Bridge—Part Bridge, Part Pontoon, *Big River* 1:12 (1965); William Petersen, "Mississippi River Floods," *Palimpsest* 46:7 (1965); A. W. Robinson, "Dredges: Their Construction and Performance . . .," *Transactions of the American Society of Civil Engineers*, 54(C) 1905; Lucy Rodenberg, "Rafting and Lumber Business Played Big History," *North Iowa Times* (Feb. 21, 1966); Everett A. Streit, *Once Upon a Time*, vols. 1, 2 (Clinton: *Clinton-Herald*, 1993); Sally Scarff, *Marquette Valley News* (March 1966); Robert Taft, *Photography and the American Scene* (New York: Dover, 1964); John Thompson, *Biographical Notes and Commentary on the Work of Henry Bosse* (1991 report for U.S. Army Corps of Engineers, Rock Island District); C. MacDonald Townsend, "The Improvement of the Upper Mississippi River," *Engineering News* 61:18 (1909); Roald Tweet, *Rock Island District: 1866-1983* (Rock Island: U.S. Army Engineer District, 1984), and *Taming the Des Moines Rapids: The Background of Lock 19* (1978); U.S. Army Corps of Engineers publications and annual reports (1875-1926); War Dept. correspondence regarding Bosse's death in the National Archives and Records Administration; Frederick Way, Jr., *Way's Packet Directory, 1848-1983* (Athens: Ohio University, 1983); and *Way's Steam Towboat Directory* (1990). Complete annotations are in the *Iowa Heritage Illustrated* production files (SHSI-Iowa City).





In 1885 Bosse photographed this view of North McGregor, Iowa, and its pontoon bridge in the distance. Here in 1836, a Scotsman named Alexander McGregor had established a ferry across the river from Fort Crawford at Prairie Du Chien, Wisconsin. Following the Civil War, the two namesake Iowa villages of North McGregor and nearby McGregor grew into thriving ports. In the early 1870s, the Chicago, Milwaukee, and St. Paul Railroad chose North McGregor, the smaller of the two towns, as a bridge site because of an extremely low approach grade and an island between the shores. In 1873, railroad agent Joseph Lawler constructed fixed spans on the banks and the intervening island, but he lacked a specific plan to connect these approaches for rail travel without obstructing river traffic. Mike Spettel, a German-born shipwright, designed the perfect solution: timber pontoons connecting the fixed spans. Lawler had these two peculiar structures built during the winter of 1873. When not in use, the pontoon sections were floated open, pivoting out of the steamboat channel to accommodate the passage of vessels, log rafts, and ice floes. Tradition holds that these were the world's first permanent pontoon bridges.

Bosse's photo is dominated by the W. and J. Fleming Sawmill and Lumber Company, one of North McGregor's largest employers. During the height of the logging season, this company employed 120 workers. The gangplanks are elevated from the river mud and high water levels.

Prominent among the buildings in the background is the grandiose three-story Merchant's House; its imposing cupola provided kingly views of owner Gerhard Wingen's sawmill concerns on nearby islands.

Despite a healthy economy, North McGregor was physically limited by the narrow riverfront valley of Bloody Run Creek and the immense bluffs. As the century turned, the town's economy eddied due to declining logging and river traffic. In 1920, the citizens of North McGregor opted for a name change to Marquette to allow for a measure of independence from its sister city. Through the years, the pontoon bridge was viewed as a successful structural oddity, floating trains over the river. But by the 1950s, railroad commerce through Marquette had slackened, and in 1961 the bridge was dismantled. Although the river lost one of its truly unique landmarks, today Marquette is a well-preserved showcase village with spectacular river views.





BOTH IMAGES: U.S. ARMY CORPS OF ENGINEERS, ROCK ISLAND DISTRICT

Opened for horse and wagon traffic in July 1891 (and photographed the same year by Bosse), the Fulton Highway "high fixed" bridge was constructed by the Lyons and Fulton Bridge Company over the narrows between Lyons, Iowa, and Fulton, Illinois, one of the Midwest's busiest ferry crossings. Bosse's photograph looks west towards Lyons, which was annexed to Clinton in 1894.

The photo captures the graceful arches and unique lattice patterns engineered into this bridge. The entire structure had a light, airy appearance due to the riveted steel truss framing and supporting tie rods. Cars and trucks using the tollbridge could be fined \$5 if driven faster than a walk over the wooden deck. The bridge was demolished in August 1975.



This swingspan bridge at Clinton, Iowa, was built by the Central and Northwestern Railroad between 1864 and 1866, and photographed by Bosse in 1885. A swingspan rotates to allow through passage and works well at relatively level approach grades.

Although the Corps of Engineers regulated bridge construction for river navigation because Congress and the courts had determined that bridge heights and piers could not impede river traffic, bridges intimidated older steamboat pilots, who yearned for the days when the "Mississippi was King." But by the late 19th century, the importance of railyards and depots had supplanted steamboat landings in river towns as trains carried the lion's share of commerce. Their routes were straight, dependable, and linked to a steel web of destinations. Steamboat trade was seasonal and affected by weather and water conditions.

Considered an engineering marvel in its time, this bridge was replaced in 1908. Today, all the remaining swingspan bridges on the Upper Mississippi River are railroad bridges; a few also take vehicular traffic.







U.S. ARMY CORPS OF ENGINEERS, ST. PAUL DISTRICT

The only photographs Bosse took in the spring of 1888 were a series of ten views of the flood waters within the city limits of Davenport and Rock Island, thus beginning a Corps tradition of photographing Mississippi River floods. This image shows Front Street in Davenport.

The Flood of 1888 was one of the worst on the Upper Mississippi. From Dubuque to Keokuk, the Mississippi set records or near records that year.

The *Muscatine Daily News* of May 14, 1888, reported a 17.41-foot flood stage, predicting it would "stand as the highest on record for years, possibly for a century. . . . While this is barely an inch higher than the great rise of 1881, an inch added to that mad flood with a surface of 3 to 8 miles in width means a vast volume of water."



**S**tacks of lumber await shipment in this 1885 photograph of Fort Madison. Logging was one of the first land-based industries of the Mississippi and included woodhawks who supplied wood fuel to passing steamboats, raftboats that pushed rafts of logs downstream, and large sawmills that supplied the lumber, trim, and shingles for the Midwest.

Corps improvements on the Mississippi resulted in much of the economic growth along the river, especially in the lumber industry. In 1879, the Corps reported to Congress that "between the mouth of the Chippewa and Saint Louis there are 73 mills on the main river, with an annual day-sawing capacity of 600,000,000 feet, employing 12,000 men, and representing \$12,000,000 of capital. The estimated produce of white pine floated into the Mississippi River in 1878 was 826,000,000 feet of lumber, 218,000,000 shingles, and 109,000,000 laths."



U.S. ARMY CORPS OF ENGINEERS, ST. PAUL DISTRICT





**B**osse took 16 photographs of the Des Moines Rapids Canal, the largest number of any area of river improvements—evidence of the canal's importance relative to Corps expenditures, and of the problems caused by the Mississippi's Des Moines Rapids.

So named because of the Des Moines River tributary, the Des Moines Rapids were as challenging and dangerous to navigate as floods and low water were, and caused numerous wrecks. The rapids stretched between Montrose and Keokuk. This section of the Mississippi was a very wide area interspersed with rock ledges and littered with boulders deposited by glaciers during the last Ice Age. Through time, the erosional forces of the river had exposed the boulders, making the Des Moines Rapids one of the most dangerous stretches on the Upper Mississippi.

The rapids had been surveyed as early as 1837, by Lieutenant Robert E. Lee and Second Lieutenant Montgomery C. Meigs. In fact, their own boat ran aground on the rocks. In 1838 they began excavation for channel improvement through the rapids and continued for two years until appropriations were cut.

Work began again in 1866. Between 1867 and 1877, the 7.6-mile-long Des Moines Rapids Canal was built to bypass the treacherous rapids. Although some seasoned pilots continued to navigate the rapids, the slower but safer canal with its three locks became the preferred route for packet and freight boats.

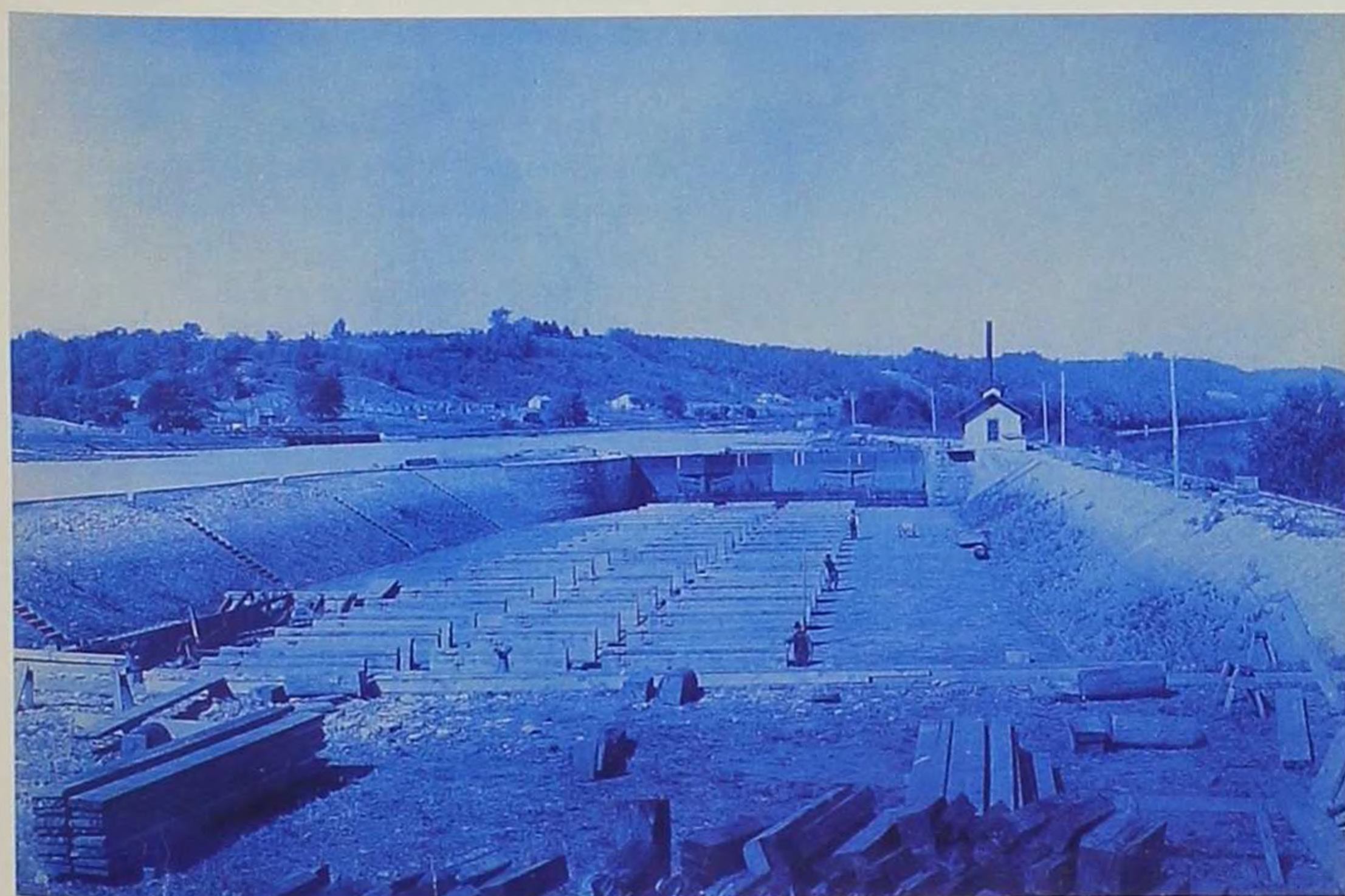
The Guard Lock (above) is the first of the canal's three locks. This lock provided no lift or fall, but was used to monitor water flows and prevent obstructions from entering the canal.

The lock was located along the Iowa shore near the head of the rapids and a cluster of buildings called Nashville (later, Galland), an early territorial town. The split rail fence in the foreground of Bosse's 1885 photograph is a reminder of the area's rough topography and early settlement.

Closer to the river, a Chicago, Burlington, and Ohio Railroad locomotive with five freight cars and caboose is stationed on a siding. The Corps steamlaunch *Louise* and two barges for laborers' quarters are in the canal's turning basin.



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ALL THREE IMAGES: U.S. ARMY CORPS OF ENGINEERS, ROCK ISLAND DISTRICT

**S**till waters reflect the 27-square-foot building that housed the lock machinery at the canal's middle lock (above). Because the gates were opened and closed by a steam pump, each lock required only a single worker.

**Left:** A view of the dry dock. The locks were constructed of limestone from the nearby Sonora Stone Quarries. The miter gates were built of cedar and cypress wood. Each lock was 350 feet long, 80 feet wide at the surface, and provided a minimum depth of five feet.



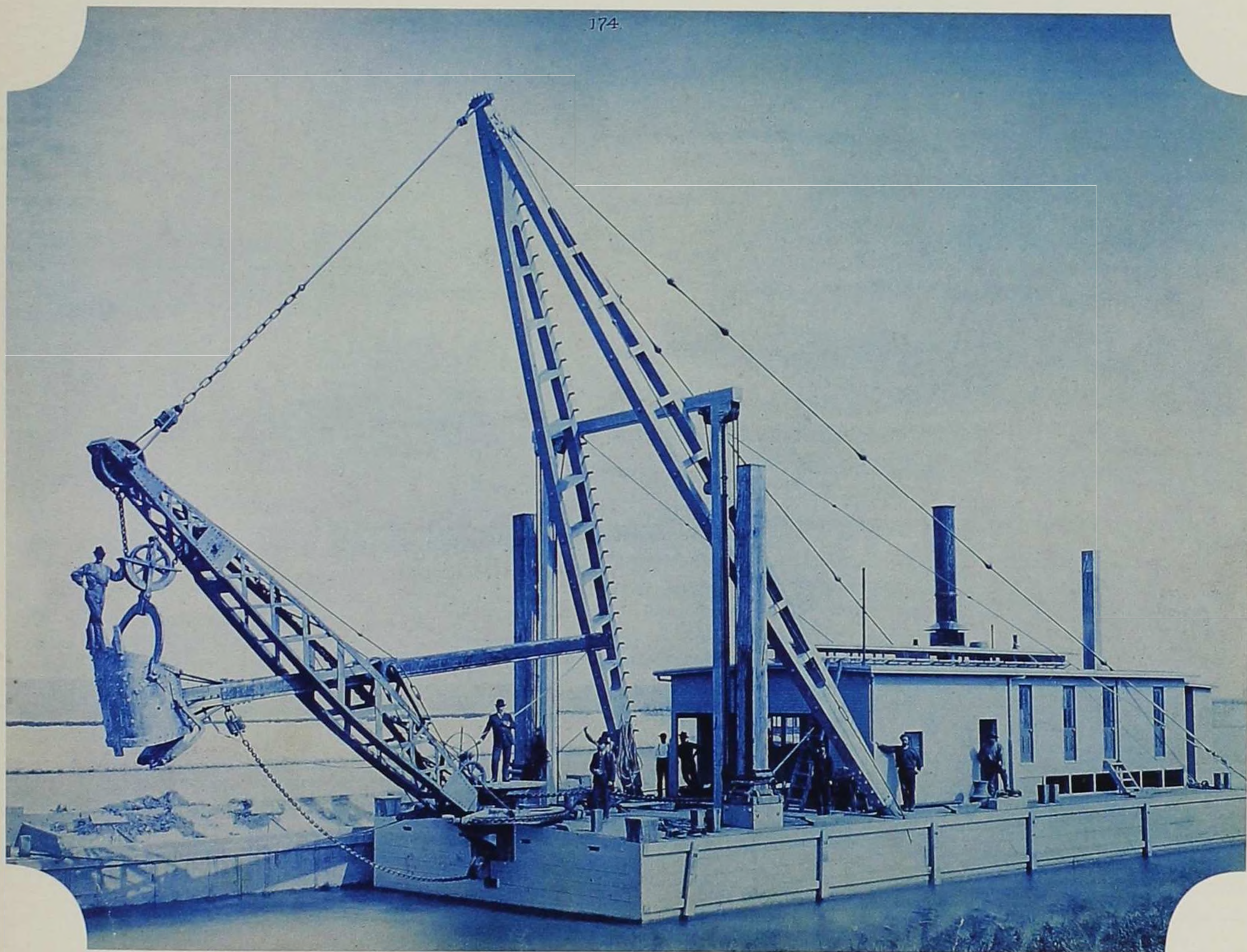


ALL THREE IMAGES: U.S. ARMY CORPS OF ENGINEERS, ROCK ISLAND DISTRICT

**T**he Lower Lock of the Des Moines Rapids Canal was at the foot of the rapids, at Keokuk. In the above view, taken by Bosse in 1885, the *Louise* is docked above the lock. Built by the Corps at the Keokuk boatyard, the *Louise* was a single-deck, one-stack towboat. At the expense of power, it was built small to maneuver in the canal.

**Left:** At the Lower Lock, the main buildings were constructed in the massive Romanesque style with locally quarried stone blocks. At the rear of the lock grounds were machine and repair shops of the Rock Island District Boatyard, where the Corps constructed vessels and maintained its fleet. Here also was the office of the engineer for this section of the river, Montgomery Meigs. Meigs was a capable, highly educated engineer and the son of Montgomery C. Meigs, who had first surveyed the rapids with Robert E. Lee in the 1830s.





The spanking-new dredge the *Phoenix* was docked in the Des Moines Rapids Canal when Bosse took this image in 1888. Dressed to the hilt, high-ranking Corps engineers stand at attention; a crew member strikes a pose suspended over the water on the bucket of the crane.

Like drill boats, chisel boats, building and grasshopper barges, pile drivers, and derrick boats, dredges contributed mightily to the Corps of Engineers' river improvements. Teamed with snag boats and dynamite, dredges removed boulders, sand bars, and sunken ships, and dredged and scraped sediment from the channel, harbors, and at the mouths of tributaries.

The earliest Corps dredges on the upper river were not self-propelled. They consisted of a barge with a crane or boom, on which was mounted a single dipper operated by a hoisting engine. A crane operator, two or three deckhands, and a fireman made up the crew. The variety of work conducted by dipper dredges revealed them to be versatile and well adapted to construction projects and debris removal. Civil engineers found them handy to maneuver in confined spaces.

Besides the *Phoenix*, the Corps depended on two more dredges, the *Ajax* and the *Vulcan*. Their names, drawn from mythological imagery for fire and explosions, conjure up the huge clouds of black coal smoke that billowed forth from their stacks during operation.

In the Corps of Engineers, naming a vessel is a tradition usually reserved for self-propelled boats; the fact that these three dredges were named may have reflected their growing importance to the Corps flotilla.





U.S. ARMY CORPS OF ENGINEERS, ROCK ISLAND DISTRICT

**B**osse took one of the earliest photographs of historic Mechanic's Rock, immortalizing its significance to river pilots and Corps improvements. He photographed the rock during a survey of the river at the low water of 1889, hence the inclusion of a rodman.

Mechanic's Rock was one of the largest glacial boulders that littered the Des Moines Rapids. The five-ton boulder had acquired its name after being struck by the steamboat *Mechanic* in the 1830s. The cause of many wrecks, Mechanic's Rock was moved from the navigation channel in the rapids by a team of oxen in the 1840s.

For the remainder of the century, Mechanic's Rock became a landmark on the Upper Mississippi. Even after the 7.6-mile canal was built to skirt the rapids, seasoned steamboat pilots who could read the rapids' eddies and swirls used Mechanic's Rock to navigate the rough water. By the end of the century, however, few raft pilots took on the rapids, and then only at high water.

In 1905, Congress authorized the construction of the Keokuk Dam and Power Plant spanning the Mississippi. Consequently, in 1913 the new 50-square-mile Lake Keokuk reservoir inundated the infamous rapids and the bypass canal. Mechanic's Rock was now covered by some 17 feet of water.

In recent years, the history and exact location of Mechanic's Rock have been further researched. As a 1996 Iowa Sesquicentennial project, the city of Montrose enlisted divers and a mechanical dredge to retrieve Mechanic's Rock from the deep, murky waters of the Mississippi, somewhere near Upper Mississippi River Mile 374. The effort failed, but Mechanic's Rock is now under consideration for the National Register of Historic Places.

Bosse's evocative image of Mechanic's Rock is a vivid reminder of the "great experiment"—when the Corps of Engineers worked to tame the Mississippi into a safe, navigable waterway. ❖